as gravitation, and to avoid it on the earth is impossible; and with this conclusion vanishes all hope of a perpetual motion machine. If we are inclined to regret this fact, a little reflection on what would occur if friction ceased to act may not be uninstructive, for the whole face of Nature would be at once changed, and much of the dry land, and, even more rapidly, most of our buildings, would disappear beneath the sea. Such inhabitants as remained for a short time alive would not only be unable to provide themselves with fire or warmth, but would find their very clothes falling back to the original fibre from which they were made; and if not destroyed in one of the many possible ways—such as by falling meteors, no longer dissipated by friction through the air, or by falling masses of water, no longer retarded by the atmosphere and descending as rain—would be unable to obtain food, from inability to move themselves by any ordinary method of locomotion, or, what would be equally serious, having once started into motion, from being unable to stop except when they came into collision with other unhappy beings or moving bodies. Before long they, with all heavier substances, would disappear for ever beneath the waters which would now cover the face of a lifeless world.

We turn to the motion of planetary bodies—is that perpetual? At first, everything seems to show that it is. The earth with its mass of 3000 trillion tons turns with a speed which enables a student to go bare-headed a good many miles without catching cold in the act of saluting a Professor, for a long time defied all attempts to detect in it loss of speed; but with the friction of the tides continually at work such loss must take place, and now it is pretty certain from the calculations of Adams, the astronomer, that the earth loses about an hour in 16,000 years, and is coming to rest, though it must be admitted rather leisurely. So, also, the hurrying up of the comets as they go round the sun is possibly accounted for by a retarding action in space which makes it necessary for them to try and make up, as it were, for lost time; and in fact the general arguments in the present day are in favour of what Sir Isaac Newton believed—that the motions of all bodies in space are suffering retardation, and that their velocity is becoming less and will ultimately cease.

Perpetual motion, then, is impossible. By no means. We have duly considered motion of matter in its visible and mechanical form, and if the foregoing remarks are true, then in this form assuredly it is; but there is, as we have seen, the great fact of indestructibility of energy, and the greatest generalization of the present century is that which accounts for the disappearance of energy in the form of mechanical and visible motion by showing that an exactly equal amount appears in the form of molecular and invisible motion. To this all outward motion tends, and friction is the agency by which the change is effected. Down to a certain point the change can be effected in either direction, and the heat-engine converts molecular motion into mechanical, again to be reconverted into molecular motion in all its working parts, as well as in connection with the useful work it does. This stage reached, there is no process known to us by which the cycle can be continued, and the term "degradation," in the sense of having gone down a step, but nevertheless a step which can never be reclaimed, is applied to the tendency of energy to assume molecular form by dissipation over a larger mass of matter, so that its effect is less intense, though equal numerically in amount. To this all Nature tends, and beyond this point we cannot go. Here, at any rate, the motion is perpetual, but it is motion that tends to approach a state unsatisfactory to the instinct of the human mind. Great intellects, such as Rankine and Siemens, have striven to conjecture ways at present unknown to us by which the energy now spreading itself over the vast expanse of space may be gathered again and regenerated, so that we may look forward not to the lowest but to the highest form of motion as that which, passing through all its cycles, shall last for ever.

THE CHAIR OF DARWINISM IN PARIS.

ONE of the most interesting evidences of the differing results of municipal organization in foreign countries, as compared with those resulting from such organization in our own, is the news that the Municipal Council of Paris intends to found (in connection with the Sorbonne, or the Jardin des Plantes, or the Collège de France, we do not know which) a Chair of Philosophical Zoology, with a special view to the propagation of the doctrine of evolution as elaborated by Darwin. It appears that the official naturalists in France—those holding the leading professorships and museum appointments—have not hitherto been very friendly to Darwinian doctrine. The Municipal Council of Paris has recognized the fact that there is an undesirable hostility to Darwin's views amongst the official group, and actually proposes to remedy the evil results of this hostility by establishing a new Chair, destined to give fair play and a full hearing to the new philosophy. It is as though the Corporation of London should propose to build and endow a laboratory of physiological experiment or of bacteriology. The imagination recoils before the task of picturing Mr. Alderman Greenfat expounding to his colleagues the importance to the community of scientific research, and carrying with him a large majority in favour of a scientific enterprise hitherto neglected and even penalized by middle-class authority.

There is very little doubt as to who is the fittest man in France at this moment to hold such a Chair as that which is now to be created. M. Giard, for many years Professor of Zoology at Lille, and only this year called to a similar Chair in Paris, has not only been the first in France to teach from an official position the doctrine of evolution in zoology, but has made many most valuable researches himself, and has created a school amongst whom are the ablest of the younger French zoologists. Every embryologist knows the works not only of Alfred Giard, but those of his pupils Barrois, Halley, Monnet, and others. Alfred Giard had to submit to some painful remonstrances, and to imperil his official career as a Professor of Zoology in France, when he determined to break with the traditions of his eminent master, Henri de Lacaze Duthiers, and to boldly accept Darwinism and the methods of the modern English and German school. It is therefore only right that his name should be the first to be considered in relation to the new Chair in Paris, and we have no hesitation in saying that, should he be appointed, a man will have been secured as the first occupant of a difficult position whose qualifications render it certain that he will not only do credit to himself, but will justify, by his successful teaching, the enlightened, patriotic, and high-minded initiative of the Municipality of Paris.

E. R. L.

NOTES.

ON the 3rd of this month there passed away a Scottish parish minister, who though not himself a scientific man has come in contact with three successive generations of men of science whom the love of travel or of geology has led to the picturesque island of Skye. The Rev. Dr. Donald Mackinnon was the third of his family who have been ministers of the parish of Strath. His grandfather was appointed to the incumbency in 1777, and held it for forty-nine years. His father took the office in 1826, and held it for thirty years, until he himself succeeded to it in 1856. The parish has thus been presided over by the same family for the long period of 110 years. Unfortunately none of the numerous family of the deceased clergyman have entered the Church, so that the interesting ecclesiastical connection of the family with the parish now comes to an end. Dr. Mackinnon was a noble type of the true old Highland gentleman, dignified, courteous, kindly, and always the same, whether conversing with crofter or countess. He was delighted to tell his reminiscences of the old geologists. It was his uncle who put into visible expression by his famous but unspeakable "device of the pots" (as Barbour has it) the universal indignation of Skye at the account of the island and its inhabitants given by the geologist Macculloch, in his book on the Highlands and Western Islands. It was in his father's house that Sedgwick and Murchison were entertained when they passed through the north-west Highlands in 1827, and he had some amusing stories about the impression made on himself and his brothers by the doings of these two great brethren of the hammer. In later years geologists and other students of science, as well as artists and distinguished men of many kinds, have enjoyed the hospitality of his home at Kilbride under the shadow of the great mountain, and in sight of the gleaming Atlantic. Only a few months ago he had an opportunity of renewing his early love for mineralogy and geology, and while riding on his favourite quiet cob, looking after his farm-servants as they harvested between the showers of a Skye September, he would stop now and again to point out geological features that had been familiar and interesting to him from boyhood. He belonged to a type of Scottish clergyman that is slowly disappearing, and carries with him the affectionate regrets of everyone who was privileged to enjoy his friendship.

The Annual General Meeting of the Royal Meteorological Society will be held at 25 Great George Street, Westminster, on Wednesday, the 18th instant, at 8 p.m., when the Report of the Council will be read, the election of officers and Council for the ensuing year will take place, and Mr. W. Ellis, the President, will deliver his address.

On Tuesday next (January 17), Mr. George J. Romanes will begin at the Royal Institution a course of ten lectures, being the first part of a course on "Before and After Darwin;" Mr. Hubert Herkomer will on Thursday (January 19), begin a course of three lectures on (1) "The Walker School," (2) "My Visits to America," and (3) "Art Education"; and Lord Rayleigh will on Saturday (January 21) begin a course of seven lectures on "Experimental Optics." The Friday evening meetings will begin on January 20, when Lord Rayleigh will give a discourse on "Diffraction of Sound."

The following are the arrangements for the Penny Science Lectures at the Royal Victoria Hall for the present month:—January 10, "The Great Sea-Serpent," by Arthur Stradling; January 17, "Caves and Cave-Men," by F. W. Rudler; January 24, "The Oldest Monuments in Brittany and Britain," by Prof. Bonney, F.R.S.; January 31, "Speech made Visible, or Picture-Writing as it was, and as it is now," by Prof. Ramsay.

Lectures will be delivered in Gresham College, Basinghall Street, E.C., on January 17, 18, 19, and 20, at 6 p.m., by Dr. E. Symes Thompson, on "Sleep, Sleeplessness, and Pain."

In reference to the review in these columns last week (p. 218) of the second series of collected papers on Indo-China, we observe from the last Annual Report of the Council of the Straits Branch, Royal Asiatic Society, that there is at present no intention of proceeding further with the publication of selected papers on the East Indian Archipelago. The Council, however, expresses a hope that, at some future time, an effort will be made by the Society to translate and publish selected papers which have appeared in the Journals of Societies in Holland and Java, written by learned Dutch Orientalists. The Report adds that the new map of the peninsula, to which we have several times referred, was finished in 1886, but before it could be sent to England the Siamese Government gave further geographical information concerning the northern part of the peninsula, and the map will not be published till this new information is incorporated in it.

In the November Bulletin of Miscellaneous Information, issued from the Royal Gardens, Kew, attention was drawn to the subject of fruit-growing in British colonies, and an admirable report on the fruits of Canada was given. The treatment of the subject is continued in the January Bulletin, which contains full reports sent by the Governments of Victoria, South Australia, Western Australia, Tasmania, New Zealand, Cape Colony, and Mauritius. Prominence is given to the quantity of fruit actually available for export in each colony. To this the writers add the months during which the fruit is in season, and the prices usually paid for it locally. It was intended to publish the reports from the Australian colonies, Tasmania, New Zealand, and the Cape of Good Hope in one series, so as to present a general review of the fruit industries of the Southern Hemisphere; and this was to have been followed by reports dealing exclusively with the fruits of tropical colonies. So far, however, reports from New South Wales and Queensland have not been received.

An interesting paper, by Mr. Daniel Morris, on the use of certain plants as alexipharmics, or snake-bite antidotes, has just been issued. Mr. Morris explains that his enumeration of the plants reputed to possess alexipharmic properties is offered without any expression of opinion as to their value. It is intended chiefly as an attempt to bring together for the first time a summary of information about these plants, in order that inquiry may be made to confirm or refute the popular opinion respecting them. "Opportunities," says Mr. Morris, "to test the action of these plants on a person actually bitten by a well-known poisonous snake are seldom offered to a competent investigator. But as material is being brought together which can be carefully tested by chemical and therapeutical investigations, the most prominent of these plants, such as species of *Aristolochia* and *Mikania*, deserve very careful attention."

A valuable paper, by Prof. Marshall Ward, on the tubercular swellings on the roots of *Vicia Faba*, has just been printed in the Philosophical Transactions of the Royal Society.

Messrs. Swan Sonnenschein and Co. will publish in a few days a new work by Mr. Theodore Wood, entitled "The Farmer's Friends and Foes." The book describes in considerable detail the nature and habits of those animals, birds, and insects which exercise a good or evil influence upon the products of British agriculture, and is profusely illustrated.

We have received the "Annuaire," for 1888, of L'Académie Royale des Sciences, des Lettres, et des Beaux-Arts de Belgique. It contains full information as to the organization, rules, and work of the Academy; and there are several rather elaborate memoirs of late members. Each of these memoirs is accompanied by a carefully-engraved portrait.

Capt. M. Rykatschew, the Assistant Director of the Central Physical Observatory at St. Petersburg, has published in the *Repertorium für Meteorologie* (Bd. xi. No. 2) a discussion of the winds and pressure of the Caspian Sea. The title is misleading, as the observations are made on land, ten stations being on the shores of the Caspian Sea, and nine in neighbouring districts. And the mean winds are deduced by Lambert's formula, which deals with the number of observations without reference to the force of the wind. Nevertheless the work is a valuable and elaborate discussion, based on trustworthy observations extending from three to forty-four years.

The mean wind-frequency and pressure are given for every month, for seasons, and for the year, and charts are drawn for the seasons and for the year. The work is a continuation of previous similar discussions of the winds of the Baltic, the White and Black Seas, and the Sea of Azov.

In the *Archives des Sciences Physiques et Naturelles* for December 15 last, M. P. Plantamour publishes the results of observations of the periodic movements of the ground from October 1, 1886, to September 30, 1887, as shown by spirit-levels fixed in the exterior and central partition walls of his house at Secheron, near Geneva. The oscillations are illustrated by curves, from which it is seen that the movements exhibited by the two levels are not always parallel, but vary in a regular manner, and that both curves follow the variations of temperature throughout the year. Experiments have been carried on for nine years, but a longer series is necessary to arrive at definite conclusions.

M. A. F. Sundell publishes in vol. xvi. of the Proceedings of the Scientific Society of Finland, the results of comparisons of the standard barometers at the principal Observatories of Europe, with the view of showing what corrections are to be applied to reduce the readings of different countries to absolute uniformity. The comparison shows the existence of considerable differences between the various standards. But as the experiments were made with an instrument which was filled with mercury at each comparison and afterwards emptied, it is a question whether the results obtained may be considered perfectly trustworthy.

A new compound of arsenic, containing that somewhat remarkable substance, hexiodide of sulphur, has recently been prepared by Dr. Schneider, of Berlin (*Journ. für prakt. Chemie*, No. 22). Hexiodide of sulphur, SI_6, was prepared some time ago by Landolt by evaporation of a solution of iodine and sulphur in carbon bisulphide at a low temperature: it forms pyramidal crystals, shown by Von Rath to belong to the rhombic system, and, curiously, is isomorphous with iodine itself. It is a compound of considerable theoretical interest, inasmuch as it is the only known instance in which the supposed six combining bonds or affinities of sulphur are satisfied by monad atoms. One would naturally imagine that such a compound would be eminently saturated, and it has never hitherto been known to effect any further combinations; but Dr. Schneider now shows that it is capable of forming a crystalline double compound with arsenious iodide, of the composition $2AsI_3 . SI_6$. This new compound was first incidentally obtained during a lengthy research upon the relations between arsenious sulphide and iodine, and its discovery forms another example of the happy manner in which important results are often most unexpectedly attained by following the by-paths which so frequently lead off from the high-way of systematic research. It may, however, be synthetically prepared by gently warming a mixture of SI_6 and AsI_3 in the proportion of one molecule of the former to two of the latter: the two substances melt together to a deep-brown liquid, which, on cooling, solidifies to a dark gray crystalline mass. The crystals are homogeneous, tolerably hard and brittle, yielding a reddish-brown powder on pulverization; they cannot be preserved in the air, as they lose all their iodine in twenty-four hours, but in sealed tubes may be kept any length of time. The double compound itself, however, is nothing near so interesting as the important theoretical questions which it suggests. We may well ask, Is it possible that the atoms of sulphur are still endowed with a certain amount of combining energy after their six "affinities" are satisfied? or do the iodine atoms act in this case in one of their higher capacities?

At the last meeting of the Geographical Society of St. Petersburg, M. Kuesenoff gave an account of an interesting nomad tribe in the Ural Mountains, calling themselves Vagueles. In the winter they dwell in wooden huts, and in the summer wander among the mountains, living in tents. At the former season their clothing consists of deerskin, and at the latter of linen garments. They worship the sun and some of the stars, and have a superstitious dread of certain forests, which they deem sacred. Women hold a very inferior position, being treated as slaves. During the last few years contact with more civilized tribes has had a good influence on the Vagueles, and some of them have begun to settle down as tillers of the soil. The tribe is said to be of Finnish origin.

On December 10, about 6 p.m., a meteor was seen at Hönefos, in Norway. It went in a north-easterly direction, emitting a brilliant bluish-white light, and lasted a few seconds.

On December 18, about 8 p.m., a magnificent meteor was seen in several parts of the province of Stockholm, going in a direction north-west to south-east. It shone with a bluish light. It left a broad trail in the sky, and eventually burst into tiny fragments, but without any report.

What is believed to be a meteorite has just been dug out of the ferry harbour of Nökjobing, in Denmark. The stone, which weighs about half a ton, was found in soft mud, and no other stones were near it. It is very dark in colour, contains iron, and is of unusual weight for its size, the work of moving it being very laborious. It has now been blasted to pieces, which will be examined scientifically.

Last year a Phanerogam hitherto never met with in Scandinavia (*Juncus tenuis*, Willd.) was found near Vexio, in Central Sweden. In Europe this plant is found only in a few localities in Germany, Holland, and Scotland.

During last autumn, in October and November, ornithologists in the province of Tromsö, in the extreme north of Norway, were interested by the sudden appearance of large flocks of the so-called "Nut-crow" (*Nucifraga caryocatactes*), a bird hitherto never seen in Northern Norway, and which is scarce even in the southern part of the country. Several specimens were shot and forwarded to the Tromsö Museum. It is surmised that the birds were driven thus far north, during migration, by stormy weather.

Owing to unfavourable weather, the cultivation of oysters on the coast of Norway was not so successful last year as in previous years.

Last autumn an attempt was made to bring live cod from Iceland to Norway on board smacks, and 6000 fish were brought over to Bergen successfully. Here, however, many of them died, on account of the basin in which they were kept until the sale could be effected being too small. This year fresh attempts will be made.

The temptation of French architects seems to be to attend to the decorative rather than the useful parts of the buildings they design. The architect who designed the new Medical School in Paris took so little pains about the distribution of the water-pipes, that in very cold weather the laboratories (chemistry, physiology, bacteriology, experimental pathology, &c.) are wholly deprived of water. Last week the water in all the pipes was frozen, so that not a drop of water was available in a single laboratory. Of course, everyone connected with the school complains that work under such conditions is nearly impossible.

The new Sorbonne will be a handsome building, but, unfortunately, the work is soon to be stopped owing to lack of money. The ornamental part of the building is finished, but the useful part has not yet been begun.

The *Ceylon Observer*, writing on the great trigonometrical survey of that island, states that its connection with the continent of India by a network of triangles is now an accomplished fact, Mr. More, District Surveyor, having in November last finished his series of observations with the large theodolite. Nothing now remains but to reduce the observations, a work which it is anticipated will take about six months. Mr. More had enormous difficulties to overcome in his survey. The north of the island is so much covered with forests that he was compelled to erect lofty stages for his theodolite, at a height of from 40 to 70 feet above the ground; and the observed signals were in many cases 140 feet from the earth. All these stages had to be made on the spot, the appliances at hand being of the poorest description, and it was with the greatest difficulty that the structures thus made were kept at the necessary rigidity. The climate is so uncertain that the surveyors often watched for days without seeing a flash from the heliostat, and at other times every member of the working parties was prostrated by fever. As the observers approached the coast, stone towers were put up instead of timber stages, and these towers will serve not only as permanent survey stations, but as landmarks for those navigating the neighbouring waters. In all, eleven stone towers were erected, and very many wooden stages. Ceylon, by the completion of this trigonometrical survey, is now free from the reproach which it has lain under since the Indian surveyors finished their portion of the work. There is now a complete chain of triangles from Asiatic Russia to the south of Ceylon. The *Observer* adds that it is curious to note that exactly one hundred years ago (1787) a complete triangular connection was formed between Great Britain and France across the Channel under the superintendence of General Roy, R.E.

THE additions to the Zoological Society's Gardens during the past week include a Burrowing Owl (*Speotybo cunicularia*) from South America, presented by the Rev. Basil Wilberforce; a Vulpine Phalanger (*Phalangista vulpina* ♀) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

O'GYALLA SPECTROSCOPIC CATALOGUE.—The systematic survey with the spectroscope, undertaken for the northern heavens several years ago, by Prof. Vogel and Dr. Dunér, the former examining the region from Decl 1° S. to Decl. 40° N., and the latter that from Decl. 40° N. up to the Pole, has been now carried some considerable distance into the southern hemisphere by Dr. N. de Konkoly and his assistant, Dr. Kövesligethy; and the second part of the eighth volume of the O'Gyalla observations, which has recently appeared, contains a spectroscopic catalogue of the stars down to mag. 7·5, lying between Decl. 15° S. and the equator. The work was commenced in August 1883, and was completed in August 1886, 2797 spectra having been observed on ninety nights. A number of these were observed on more than one night, so that the resulting catalogue contains only 2022 stars. Vogel's arrangement of types was followed, so that the present catalogue is on the same lines as those of Vogel and Dunér. The annexed table gives the number of stars ranged under each type.

I.*a.*	I.*b.*	I.*b*?	I.*c*?	II *a.*	II.*b.*	III.*a*	III.*b.*
990	4	12	1	865	2	87	3

Continuous.	Monochromatic.	?
41	3	14

The three monochromatic spectra indicate the presence of minute planetary nebulæ. There was only one star spectrum suspected of showing a bright line, a star of mag. 6·5 about 50′ *n* of ζ Orionis. This latter star, together with β, δ, and ε of the same constellation, Dr. Konkoly finds to be variable as to its spectrum. It is to be hoped that the details of the observations upon which so important a statement is based will be published. And it is also to be desired that the work which has been carried so far may now be taken up by some southern observer, and the remaining portion of the heavens surveyed. It is to such works as the present, and the similar labours of Vogel and Dunér, that we must look for evidence of such physical changes amongst the stars as Dr. Konkoly would seem to predicate of the principal stars of Orion.

ASTRONOMICAL PRIZES OF THE PARIS ACADEMY OF SCIENCES.—The Lalande Prize of the Academy has been decreed to M. Dunér for his micrometric measures of double stars, and for his researches on spectra of the third type. M. Périgaud, of the Observatory of Paris, receives the Valz Prize for his important astronomical labours. Amongst those specially mentioned are his determinations of the division errors of four of the circles, and of the absolute flexure of the two principal meridian instruments of the Paris Observatory. The Janssen Prize for important progress in physical astronomy—in the recent sense of the term—awarded this year for the first time, was most appropriately assigned to the late Prof. Kirchhoff. Amongst the general prizes of the Academy should be noted the Arago Medal decreed to M. Bischoffsheim for his great and generous aid to science, and especially for his magnificent foundation of the Nice Observatory. This prize also is now given for the first time. The La Caze Physical Prize is given to MM. Paul and Prosper Henry, chiefly for their great achievements in astronomical photography.

The subject for the Damoiseau Prize for 1888 is proposed in the following question: To perfect the theory of inequalities of long period caused by the planets in the movement of the moon; to see if they exist sensibly beyond those already known.

NEW OBSERVATORY IN VIENNA.—The observatory of Herr M. von Kuffner, the erection of which was commenced in the summer of 1884, has been practically completed. The building is cruciform in shape, and is 82 feet from east to west, and 61 from north to south. The meridian instrument is by Repsold, and has an aperture of 4·9 inches, and a focal length of 5 feet; the eye-piece and object-glass are interchangeable; the circle is 21·6 inches in diameter, and is divided to 2′ and read by four microscopes. The principal equatorial is by the same maker, and has an aperture of 10·6 inches, and focal length of 12 feet 6 inches, with a finder of 2·6 inches aperture, and 26 inches focal length. The co-ordinates of the observatory are provisionally given as long. = 1h. 5m. 11·1s. east of Greenwich, and lat. = 48° 12′ 47″·2 N.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1888 *JANUARY* 15–21.

(FOR the reckoning of time, the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on January 15

Sun rises, 8h. 2m.; souths, 12h. 9m. 34·3s.; sets, 16h. 17m.: right asc. on meridian, 19h. 47·1m.; decl. 21° 10′ S. Sidereal Time at Sunset, 23h. 55m.

Moon (at First Quarter on January 21, 5h.) rises, 9h. 18m.; souths, 14h. 1m.; sets, 18h. 51m.: right a c. on meridian, 21h. 39·3m.; decl. 15° 14′ S.

Planet.	Rises.		Souths.		Sets.		Right asc. and declination on meridian.			
	h.	m.	h.	m.	h.	m.	h.	m.	°	′
Mercury..	8	9	12	2	15	55	19	39·4	23	26 S.
Venus ...	4	52	9	7	13	22	16	44·5	20	0 S.
Mars ...	0	0	5	36	11	12	13	12·8	5	17 S.
Jupiter ...	3	56	8	16	12	36	15	52·5	19	19 S.
Saturn ...	16	58*	0	49	8	40	8	24·9	19	47 N.
Uranus ...	23	56*	5	28	11	0	13	4·5	6	9 S.
Neptune..	12	23	20	3	3	43*	3	42·1	17	55 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

Jan.	h.	
18	20	Mercury in superior conjunction with the Sun.

Meteor-Showers.

	R.A.	Decl.	
	°	°	
Near π_1 Orionis... ...	72	5 N.	January 15–20.
From Canes Venatici.	180	35 N.	Swift; streaks.
Near θ Aurigæ	295	53 N.	January 14–17.